This is CS50
learn how to program in C
learn how to program in Python
learn how to program in SQL
learn how to program in JavaScript
learn how to program
learn how to solve problems
what ultimately matters in this course is not so much where you end up relative to your classmates but where you end up relative to yourself when you began
Hi David,

It’s your friend, bbd! I hope you’re well and not too worried after I left so abruptly yesterday night! After such a successful Hackathon and semester so far, I just needed to unwind a bit and take a trip to new places and fresh air! Don’t worry tho! I will return safe, sound and healthy home once I am more relaxed :D as of right now I’m just spending some few days with our tech friends up Massachusetts Avenue, they gave me a hand on moving tonight (for some reason I could never find my feet 😞) and they’ve been amazing hosts! I will see you soon and will miss you and Harvard and specially our students!!

Sincerely yours,
CS50 bbd
Hundredville

Write a Python program to solve a mystery.

A Mystery in Hundredville

The CS50 Duck has been stolen! The town of Hundredville has called upon you to solve the mystery of the stolen duck. Authorities believe that the thief stole the duck and then, shortly afterwards, took a walk out of town with an accomplice. Your goal is to identify:

- Who the thief is,
- What school the thief escaped to, and
- Who the thief’s accomplice is who helped them escape

All you know is that the theft took place on December 2, 2022 and that it took place at the CS50 Hackathon.

How will you go about solving this mystery? The Hundredville authorities have taken some of the town’s databases on the time of the theft and prepared the file for you, hundredville.csv, which contains tables of data from the time.

Using just the information in the database, your task is to solve the mystery.

Getting Started
Greetings from Yale
Hi David!

... I intend to arrive for the fair between 8:37am and 9:47am. It would be easier for my MIT hacker friends to bring me to the right location if there is someone waiting there with a sign that says “DUCK.”

Sincerely yours,

CS50 bbd
CS50 Hackathon
CS50 Fair
Install command-line tools

https://developer.apple.com/xcode/
https://learn.microsoft.com/en-us/windows/wsl/about
...
Learn Git

https://youtu.be/MJUJ4wbFm_A

...
Download VS Code

https://code.visualstudio.com/
https://cs50.readthedocs.io/cs50.dev/
Host a web site

https://pages.github.com/
https://www.netlify.com/
...
Host a web app

https://aws.amazon.com/education/awseducate/
https://azure.microsoft.com/en-us/free/students/
https://cloud.google.com/edu/students

https://education.github.com/pack

https://www.heroku.com/
https://vercel.com/

...
Ask questions

https://www.reddit.com/r/learnprogramming/
https://www.reddit.com/r/programming/
https://stackoverflow.com/
https://serverfault.com/
https://techcrunch.com/
https://news.ycombinator.com/
...
Ask questions

https://chat.openai.com/
https://github.com/features/copilot

...
Take classes

https://cs50.edx.org/python
https://cs50.edx.org/sql
https://cs50.edx.org/web
https://cs50.edx.org/ai
https://cs50.edx.org/games
https://cs50.edx.org/cybersecurity

https://cs50.edx.org/business
https://cs50.edx.org/law
https://cs50.edx.org/technology
Stay in touch

cs50.harvard.edu/communities
Thank you
Office for the Arts at Harvard
Memorial Hall / Lowell Hall Complex
cybersecurity
passwords
1. 123456
2. admin
3. 12345678
4. 123456789
5. 1234
6. 12345
7. password
8. 123
9. Aa123456
10. 1234567890
• iloveyou
• qwertyuiop
• P@ssw0rd
• ********
brute-force attacks
4-digit passcode
4-digit passcode
$10 \times 10 \times 10 \times 10 \times 10$
4-letter passcode
$52 \times 52 \times 52 \times 52$
7,311,616
4-character passcode
94 × 94 × 94 × 94
8-character passcode
94 × 94 × 94 × 94 × 94 × 94 × 94 × 94 × 94
6,095,689,385,410,816
Google

Sign in

to continue to Gmail

Email or phone

Forgot email?

Not your computer? Use Guest mode to sign in privately.
Learn more

Create account

Next
password managers
• Apple iCloud Keychain
• Google Password Manager
• Microsoft Credential Manager
• ...

two-factor authentication
one-time passwords
Google

2-step Verification

Use your device to sign in to your Google Account.

Enter verification code

Get a verification code from the "Google Authenticator" app

Enter the 6-digit code

Done

Don't ask again on this computer
hashing
alice: apple
bob: banana
...

password → hash
apple → 1
apple → ..ekWXa83dhiA
banana → 2
alice: apple
bob: banana
...
alice: ..ekWXa83dhiA
bob: ..ZS4zkCo/P7E
...

rainbow table
<table>
<thead>
<tr>
<th>password</th>
<th>hash</th>
</tr>
</thead>
</table>
alice: apple
bob: banana
carol: cherry
charlie: cherry
...

alice: ekWXa83dhiA
bob: ZS4zkCo/P7E
carol: rj98gxDTYfM
charlie: rj98gxDTYfM
...

alice:..ekWXa83dhiA
bob:..ZS4zkCo/P7E
carol:..rj98gxDTYfM
charlie:..rj98gxDTYfM
...
cherry → ..rj98gxDTYfM
salting
password → salt → hash
cherry → 50
cherry → 50kbbTM.xAinU
cryptography
key → cipher → ciphertext
plaintext → cipher
cipher → ciphertext → plaintext

key → cipher → plaintext
secret-key cryptography
symmetric cryptography
asymmetric cryptography
public-key cryptography
plaintext → ciphertext

public key → ciphertext
private key → ciphertext → plaintext
HTTPS
passkeys
private key → signature
challenge → signature
public key → signature → challenge
end-to-end encryption
Schedule Meeting

Topic
Cybersecurity

Date & Time
11/20/2023  1:30 PM  to  4:15 PM  11/20/2023

Time Zone: Eastern Time (US and Canada)

☐ Recurring meeting

Attendees
Email or name

Security
☐ Passcode 123456
Only users who have the invite link or passcode can join the meeting

☐ Waiting Room
Only users admitted by the host can join the meeting

☐ Only authenticated users can join: Sign in to Zoom

Encryption
☐ Enhanced encryption
☐ End-to-end encryption

Several features will be automatically disabled when using end-to-end encryption, including cloud recording and phone/SIP/H.323 dial-in.

Learn more
deletion
secure deletion
full-disk encryption
- BitLocker
- FileVault
- ...
ransomware
"Problem Set 10"

1. Start using a password manager or passkeys
2. Start using two-factor authentication
3. Start using (end-to-end) encryption
CS50 Quiz Show
This was CS50